

Man-Computer Symbiosis





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No, not cyborgs

- And certainly not the replacement of men with machines (automation, etc.)
- The idea of computers and people working together in a “productive, thriving relationship”

How it should work

- Licklider states two main aims:
 - “to let computers facilitate formulative thinking as they now facilitate the solution of formulated problems”
 - “to enable men and computers to cooperate in making decisions and controlling complex situations without inflexible dependence on predetermined programs”
 - People set goals, perform evaluations, form hypothesis, etc.
 - Computers do the “heavy lifting”
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How it should work (2)

- Computers currently (as of the 60s) getting better at “humanlike” tasks – proving theorems, playing chess, etc.
 - Suggests that it will continue to improve
 - AI sufficient for doing military planning by 1980s
 - Five years for symbiosis to develop
 - Fifteen years to grow it
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Aims of the Symbiosis

- Computers need well-formulated problems/preprocessed data to be able to solve them
 - Sometimes very hard to get problems/data into that state
 - So try to bring computers to that level
 - Computing in “real time”
 - Takes too long for a programmer to write code, then wait for its turn for the code to be assembled and run, and then you get your answer that isn't necessarily the actual answer to your problem
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Why?

- Licklider notes that a lot of the time of a human expert (himself) is taken up by clerical/mechanical tasks
 - Better suited to a computer
 - Humans are more suited to working at something in parallel, have flexibility in thought
 - Computers do a small number of set things well and quickly
 - Roughly opposites, thus working together would work well
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Exactly what will each party do?

- Humans will set goals, supply motivation, be able to find sources easily, etc.
 - Computers will make models from hypotheses, test those models, do simulations, show results however they are needed, transform results into more human-readable forms.
 - Also evaluate possible courses of action
 - And a subset of what humans do, but will defer to their judgement
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What is needed for this to happen?

- Fix the “speed mismatch”
 - 1960s computers too fast/expensive to work with a single person, used by many
 - Evolve into a network of giant databases/computers that would be used by all and have balanced speed
 - Need more memory
 - “billions of bits” costing “billions of dollars” to hold any appreciable fraction of scientific/technical literature
 - Need indelible and published memory (many-write, read-only)
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What else?

- Better ways of storing things in memory
 - The trie
- Fix dissimilarity between human and computer languages
 - “Instructions directed to computers specify courses; instructions directed to humans specify goals”
 - So get computers to be better at devising/simplifying methods for achieving goals

Also...

- Better I/O equipment
 - “Nowhere...is there anything approaching the flexibility and convenience of the pencil and the doodle pad...”
 - Surface displays, written character recognition
 - Large/wall displays with general information & specific information
 - Speech production and recognition
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